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Lattice effects on the magnetoresistance in doped manganese perovskites (abstract)

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A detailed study of doped $LaMnO_3$ with fixed carrier concentration has revealed a direct relationship between the Curie temperature T_c and the average ionic radius of the La site $\langle r_A \rangle$, which is varied by substituting rare earths of different ionic radii for La. With decreasing $\langle r_A \rangle$ magnetic order and significant magnetoresistance occur at lower temperatures with increasing temperature hysteresis, and the magnitude of the magnetoresistance increases dramatically. The predominant structural effect of decreasing $\langle r_A \rangle$ is to decrease the Mn–O–Mn bond angle, which is accompanied by slight variations in the Mn–O bond distance. These results demonstrate that the notion of ''double exchange'' must be generalized to include changes in the Mn–Mn electronic hopping element as a result of microstructural changes induced by composition, temperature and pressure variations. [S0021-8979(96)58908-6]

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